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ARMS AND AMMUNITION IN JAPAN.

BY WM. H. BLUMENSTEIN.

IF it requires genius to make a useful invention, it requires an equally high degree of ingenuity to adapt a mechanical device, or force, to concrete needs and conditions. In the matter of such ingenuity the Japanese are past masters.

In nothing does the clear perception of technical detail—the sure eye, the deft hand—express itself as admirably as in the ways and means adopted, and adapted, for the national defence and everything pertaining and relating thereto.

To get a proper conception of the stupendousness of the modern Japanese achievement we must bear in mind how forbid-
dingly the Empire kept itself aloof from Occidental civilization—that is to say, from the gradual accumulation of thought, conjecture, experiment, and experience in every department of science, of technique, of national life, and the sum total of inherited and acquired accomplishments expressed in the word “culture.”

We behold with awe the marvellous monuments of alien genius, the Maya, the Aztec, the Peruvian, in America, the Burmese, Hindu, and Chinese, in Asia—architectural and sculptural wonders, sublime in conception, gigantic in proportions, tremendous in effort and overwhelming in effect; but there is a gulf between the spirit that created them and our own mental world that seems to be unbridgeable; a difference that seems to deny a common root of human nature and feeling.

However, the very massiveness of the barbarian achievement points to an explanation of this difference. Here thousands and thousands of human beings must have labored together, directed by one master mind. The individual counted for nothing; he was only a part of the whole, whose sole and chief duty was blind

devotion and obedience to the ruler. Among less intelligent races, this subjugation led to a stolid, non-progressive fanaticism; with the more highly organized Japanese, it developed an intense patriotism, a love of, and pride in, their country such as it would be hard to parallel.

On the other hand, the Victorian Era will ever stand out pre-eminently as an age in which the human mind took giant strides forward. In America no less than in almost every one of the European countries arose mental giants, men of heroic genius, of dauntless spirit, of keenest penetration. It was the age that invented the railroad and the electric telegraph, conquering time and space, revolutionizing national life, vesting man with a strength, a force, a power hitherto undreamt of.

Well equipped with the attainments of his time, Commodore Perry approached the Japanese in 1853, with demands for treaties and open ports. The hated and despised foreigners had a way of reinforcing their request that was new, and some bright and far-sighted men of Japan conceived the idea of going abroad and judging for themselves how other countries compared with the fair Dai Nippon. They went and saw, saw with Japanese eyes and minds, and their hearts began to tremble for their country. They returned home and urged upon their compatriots the necessity of arming and protecting themselves; and like one man the nation responded. The sublime simplicity with which the greatest sacrifices of brain and treasure were made, will be, in times to come, a prolific source of inspiration to Japanese bards. From the Emperor down, throughout the nation, implicit trust was reposed in the most enlightened and most broad-minded of their people, and they went to work to remodel Japan without impairing her integrity.

How this was accomplished has already been described in whole libraries of books on Japan and her people, without, however, giving the Old World an adequate conception of the minute completeness with which Occidental arts and crafts were acquired and assimilated. The movement being principally a political one, the national defence became, of course, the main feature of this modernization, and a review of the Government institutions may shed some light on the matter.

With true Japanese exclusiveness and self-reliance, the aim was, from the very start, to make the country independent of the

western world. The ways and means were simple and direct. Bright young men were sent to the various European and American seats of learning and industry, there to make themselves masters of all they could learn. On their return, they became associates and interpreters to the various foreign experts who had been engaged to establish the first or model plants and factories, with imported machines, tools and implements. These, once completed, served as standards for as many more establishments of the kind as the country required, built and operated by native talent without foreign aid or interference.

No European or American gunpowder plant is as complete, on as grand a scale, as thoroughly up to date, as convenient and practical as the Japanese Government Plant at Meguro, near Tokyo, for the manufacture of all kinds of ordnance and blasting powders. The broad brow of a hill, falling rather steeply down on one side into a swampy rice-field, has been utilized for the purpose with consummate skill.

The plant is patrolled by a detachment of soldiers, who also assist at the proving tests on the well-equipped grounds set apart for this purpose. Each manipulation in the manufacturing process has its full allotment of space; yet not a foot is wasted. The buildings are massive, suitable for the purpose, neat and well kept, but without a trace of anything superfluous. Along the main street, which runs the entire length of the factory grounds, is laid out a narrow-gauge railroad, and overhead you see the wire-rope power-transmission connecting all departments. In spite of all this, the picture is unmistakably Japanese, not only because of the turned-up corners of the massive roofs, and the graceful outlines of the supports of the transmission, which are of masonwork, but because of a hundred little details in the treatment of each section. I will only mention the little cascade in which a streamlet falls down the hill, the waters of which are required for the manufacturing process. The land adjoining this hill used to be swamp,—rice-fields. Now it is drained and reclaimed, and the buildings for the heavy machinery and presses are located in this section, reared on earthquake-proof piles.

Military precision reigns supreme; and in spite of the working of powerful engines and all the humming of wheels and stamping of crushers and all the other noises of a busy industrial establishment, which turns out some five to six thousand pounds

of finished material every day, and gives occupation to half a thousand workmen, the picture is a serene one, free from the smut and dirt of labor. Free also from unpleasant memories; for there has never yet been an untoward explosion or fatality, such as blurs the records of many a similar institution under Caucasian management. Faithful devotion and strict obedience bring about unremitting attention to duty, and thereby preclude disasters, which generally are traceable to somebody's negligence.

That Japan now produces her own saltpetre in artificial plantations in sufficient quantities for her needs, is well known. Sulphur is found in abundance, as in any volcanic region, and the material for charcoal is also provided for. Guaiacum, which yields the best charcoal for powder purposes, does not thrive in Japan; but there are plenty of alders, which furnish the next best grade. Large groves of this tree cover the old lava beds on the slopes of the Fujiyama. The logs were treated according to all the rules of the art, but the wood was of so great a density, and its fibrous construction so intricate (owing to the extremely slow growth in the unyielding soil), that the charcoal made from it could be disintegrated and reduced to a granular powder only with the utmost difficulty, and with but indifferent success. No sooner had the Government been informed of this fact than a search was made throughout the land for something better than the alders of Fuji San, and it was discovered that on the islands of Oki, on the northern shore of Dai Nippon, in the Sea of Japan, there flourished splendid alders, of rapid growth and finely fibred, porous wood. Experiments proved this variety to yield an ideally good charcoal for the manufacture of powder. Immediately a forestry station was established on the islands, to take care that the supply of this wood should never be exhausted.

Here, then, we have the three chief ingredients of black and brown gunpowder, saltpetre, sulphur and charcoal, abundantly produced in the country.

The powder factory at Iwahana, which lies in the direction of Nikko, was built by the Japanese, without assistance from foreigners, after the model of Meguro, but on a larger scale. It is also well equipped with all the apparatus and machinery for the elaboration of the raw materials and the manufacture of ordnance powder, as well as all kinds of blasting powder for engineering and mining purposes. It supplies the Hokkaido, *i.e.*, the

northern provinces of Dai Nippon and the islands lying in that direction.

Very different are the conditions surrounding Udji, the powder works of the South. These are located in the neighborhood of Kyoto, the old capital of the Emperors of feudal times. The district is renowned as the best tea region in all Japan. The excellence of the product is due, not so much to better soil or attention, as to more favorable climatic conditions than exist in any other section of the country. Hence every square foot of ground was devoted to tea culture. Yet, when the War Department decided that it needed a powder plant in that province, some fifty-odd precious acres were promptly given up by the farmer to the soldier. There is something almost pathetic in the fine old tea plants that grow within the very grounds of the factory, as the builders,—of course, Japanese,—did not have the heart to destroy them, so long as the room they occupied was not actually wanted for buildings and roads.

Udji's specialty is smokeless powder, and it has the very finest distillery for the alcohol required in the manufacturing process, I have, without any exception, seen anywhere. Here, also, is a complete plant for the manufacture of guncotton, where the raw material of domestic or imported growth is picked, cleaned, dried, and passed through the various complicated, and in many stages rather perilous, manipulations of nitration. The army of workmen move about with the precision of clock-work, under the eyes of numerous foremen, inspectors and superintendents, and accidents are almost, and fatalities entirely, unknown.

Three million yen (about \$1,500,000) have been expended in the construction and equipment of this plant. Foreigners, remembering the enormous sums appropriated for Government buildings and constructions in their respective countries, rarely believe that such a splendid "job" could have been carried out without a proportionate amount of "boodle"; but in this respect the Japanese are not yet "up to date."

In times of peace, about four hundred men and two hundred girls find here steady employment, and the machinery develops from seven to eight hundred horse-power. All of the buildings are of framework, with cement floorings.

The alcohol, by the way, is made from grain, corn, rye, wheat and barley, raised on the numerous agricultural experiment sta-

tions, after American patterns, which are scattered over the fertile Hokkaido, in which the Japanese husbandman obtains valuable instruction in modern methods of farming. In every direction is manifested the ambition to make Japan independent of the outside world.

By far the most important of all establishments of this kind is the Imperial powder plant at Itabashi, which is again located in close proximity to the capital. This is practically an experiment station, where the merits of new inventions and discoveries are investigated and put to a practical test. It is of all plants the most complete, making every kind of ordnance powder—viz., black, brown, and smokeless (grains, leaflets, tube or macaroni, cordite, etc.)—for firearms of all sizes up to the largest. Its chemical laboratories, and the apparatus for the numerous auxiliary processes and manipulations, are most complete, practical and efficient. As a matter of course, it is seldom that a foreigner is admitted within the high gate. All the officials, from the director down, are natives, and concerning them I want to say that not only the chiefs of the various departments, but their assistants as well, are highly trained experts, each of whom has spent several years at European and American universities, acquiring a thorough mastery of his specialty and getting his mental horizon widened to the farthest extent, so that he might return to his country exceptionally well fitted for the position he was to fill. Scientists of the first rank, who anywhere else would be hailed as stars of the first magnitude, work here unknown to fame, satisfied to devote their matchless genius and knowledge to the welfare and the glory of their country, not with blind fanaticism, but with the enthusiasm of conviction, the noble fire of the idealist. The individual counts for nothing; the country, the Emperor, for everything.

Meguro, Iwahana, Udji and Itabashi are under the superintendence of the War Department, while the Navy Department is more especially supplied by the factory at Oji, whose specialty is smokeless powder for naval guns and the charges for the projectiles intended for explosion with lyddite effect. The establishment is situated a little to the north of Tokyo and is of very recent creation. It is planned on the very largest scale, and it is needless to add that here, too, are found all the admirable features embodied in the other plants.

From this it will be seen that the capital lies within a semi-circle of powder plants,—Meguro to the east, Oji to the north, and Itabashi to the west. The southern side is open to the sea. In the city itself is located the arsenal for small arms,—rifles, complete with bayonets, small field-guns and sabres for the cavalry. It is housed in the fortlike residence of an old-time provincial governor or Daimyo, and the original moat and rampart that protected the estate in turbulent times are still preserved. The age of the place can be surmised from the venerable old sycamores that have grown on the very crest of the wall. The buildings lie in the centre of an exquisite old-Japanese garden, full of delightful nooks and picturesque vistas, fine old trees rising out of a mass of flowering shrubbery and mossy rocks, reflected in pellucid sheets of water through which goldfish dart in all directions, or velvety lawns, glittering cascades, graceful bridges over pretty streamlets.

The beautifully proportioned, wide halls, in which feudal lords once dwelt in state, are now filled with machinery, shafting and belting, and the hum and rattle of mills and lathes, of piston and hammer, of gearing and saws. One section is given up to the manufacture of rifle barrels, all of small calibre. The blanks for these are mostly imported in the required length and size, so that they have only to be bored and grooved. In another section, the rifle stocks are made; in a third, the small parts of the weapon are produced and assembled. Still another section furnishes the bayonets; and, when the rifles are complete and adjusted, they are taken to the proving grounds, where a corps of sharpshooters systematically tests each one. Those which prove to be not absolutely perfect are returned to the factory to be righted; the accepted ones are stamped and sent to the magazines to be stored for future use. The capacity of the arsenal, in times of peace, is 500 complete rifles per day of ten working hours, with facilities for quadrupling the output by working day and night.

All this constitutes only one part of the establishment. There are a sabre factory and a plant for the manufacture of all the ammunition used in the rifles and guns, and the capacity of this is proportionate to that of the other section.

The heavy artillery guns (Arisaka's model), howitzers, mortars, long-barrelled guns and cannons for the navy and for coast de-

fence, as well as the shells or projectiles for these, are cast at the arsenal of Osaka. Most of the big lathes and milling-machines and drills, as well as the cranes and derricks for the handling of the huge pieces, are of Japanese construction, made after small imported models.

Osaka, the second city of the Empire, which is often called the Japanese Manchester, lies on a rather shallow bay, and is therefore accessible from the sea only by small, light-draft vessels, so that no trans-oceanic shipping can be done from there. To facilitate the transportation of heavy castings and big guns, a canal has been dug for the exclusive use of the arsenal, starting within its grounds, passing under the heavy rampart, and going through a rather secluded section of the country to the seacoast.

The working capacity of Osaka arsenal it is difficult to estimate, nor would the War Department allow information on that point to be spread broadcast. It is scarcely conceivable that more than an approximate figure is set down for it. Suffice it to say, that everybody is expected to do his best and is doing it. This training of legions of working-men and officers of high grade or low grade in faithful devotion to duty and country, is in itself an inestimable asset to the credit of Japan.

A section of the grounds is given up to the harness and saddlery works, and to the manufacture of bits and stirrups and all the other parts of the harness as used by the artillery and cavalry; in other words, these two branches of the army are supplied here with all their accoutrements.

The principal naval port, and the oldest one, is that of Yokoshuka, on the Yokohama Bay. From the land side, it is practically inaccessible as it is surrounded by steep mountains, the coast range reaching here its wildest section. The railroad, which connects the port with the capital overland, pierces its way through innumerable tunnels, and rumbles over deep gorges and chasms on lofty bridges that are triumphs of engineering. The main part of the town is occupied by commissary stores, warehouses, provision depots, etc.; for here is the base of supplies of the Japanese navy. Without the navy docks, Yokoshuka would still be the insignificant fishing village it was for centuries up to twenty-odd years ago, when the secluded yet deep-sea harbor was found to be the best possible naval port the Empire could desire. The dry docks are large enough to admit of five men-of-war to be

built simultaneously and finished within a twelvemonth, besides countless smaller vessels for all purposes. It is as busy and bustling a place as one can wish to see, and the solemn hills around it are forever reechoing with the clatter and clamor of ceaseless industry.

The population of the town consists almost exclusively of the officers and employees of the navy-yard and their families, and the greatest feasts they know of are the launchings of the big war-vessels, when the Emperor comes down from Tokyo in all the splendor of his gold-laced uniform and surrounded by his magnificent suite. Every available space glows with flags and flowers; everybody is in holiday attire, happy, enthusiastic, proud of his country and its enlightened ruler, whose high mind read aright the signs of the times and made New Japan a possibility. The majority of ordinary mortals feel more or less elated in the presence of men of distinction, of great achievement or vast wealth. What, then, must these people feel when they behold the descendant of an interminable line of Emperors,—great ones or small ones, but Emperors nevertheless—compared with whom Romanoff or Hohenzollern, Habsburg or Bourbon, is but a matter of yesterday.

A word about the European style of uniform worn by the Government employees. It was not for love of foreign fashions that this was adopted. It is generally discarded as soon as office hours are over. The sole reason for its adoption lies in the traditions and ceremonies that cling to the official garb of native design. Rather than shock the pious feeling towards ancient custom,—that sensitive reverence of the past that is so easily ridiculed to death, and that generally buries in its own grave the self-esteem and self-reliance of the nation,—the dress was laid aside, and the difficulty was overcome without violating either the old forms on the one hand, or the demands of modern exigencies on the other.

The wharves and the science of marine construction were acquired by Japan in scarcely more than a decade. It is this sudden springing up of new industries, this quick mastery of intricate manufacturing processes, which were absolutely unknown when the present experts were children, which have no connection with the inner life of the people, no root in ancient traditions, which originated with the unloved aliens and still bear the character of their mental world,—that makes the achievement so stupendous,

all the more as it takes in not only the "four hundred" of Japanese officialdom, but a very large contingent of the broad base of the people, of the nation.

Fifty years ago, Japan was a mediæval, feudal state, in that political stage of development from which Europe emerged about the time America was discovered. The degree of civilization the Caucasian race laboriously attained in something like four centuries, has been won in the Land of the Rising Sun in as many decades, and without any disintegration, in a well-aimed and safely guided course of natural, healthy progress. Surely, this phenomenal growth cannot suddenly stop short. But what will it bring forth? The struggle now going on in the Far East for the hegemony of the Asiatic Pacific, will settle a far deeper problem concerning the history of mankind than the statesmen and diplomats of to-day have yet dared to contemplate.

WM. H. BLUMENSTEIN.